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CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

COUNTRY Lithuania

SUBJECT Bridges of Lithuania

NO OF PAGES 3

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NO. OF ENCLS. 2 (LISTED BELOW)

(A), (B) 7 pages

DATE ACQUIRED [redacted] 25X1

SUPPLEMENT TO REPORT NO.

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1. Design of Bridges

Lithuanian bridge design is held to a narrow range of variation by ruling physical conditions and technological resources.

2. Climate

The Baltic states have a climate of continental type with moderate over-all precipitation and winter temperatures reaching an extreme of minus 30 C (minus 22 F). Flood conditions occur on the waterways as a result of melting snow in the spring.

3. Soil

Bedrock is covered throughout most of the area with a mantle of 2-5m (7-16 feet) of varied soil--gravel, sand, silt, clay, bog, quicksand. Rivers flow in deep, silt-filled trenches and foundation conditions for bridges are accordingly difficult. Bedrock is largely igneous, such as granite, syenite, and some porphyry; basalt is lacking. Along the western part of the north border of Lithuania is some dolomite. Throughout the country are extensive marsh areas and numerous small lakes.

4. Stream Flow

Most of the watercourses are small but subject to spring freshets up to 5m (16 feet). Because of these floods and poor foundation conditions, single-span designs are used where practicable.

5. Labor and Technical Force

Most steel workers were imported from Germany. The maximum number of workers imported was 500 to 600. Structural welding is not practiced in the Baltic states. For concrete construction, in the period 1920-25, most of the imported workers were German "poliere". Since that time, native labor has been trained in this field and there is now a pool of skilled concrete workers. Reinforcement is prevailingly well placed. Most of the technical men in the country are products

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of Charlottenburgh Technische Hochschule, Berlin.

6. Resources

There is no native iron and steel industry; steel construction for bridges is confined to important structures. Material and workers for these have in the past been imported from Germany and Scandinavia; currently, from the USSR and Poland. Concrete is customary for minor bridges and is used in some major ones. Cement formerly came from Germany and Belgium.

7. Designs

Statically indeterminate designs, such as continuous beams and hingeless arches, are usually avoided on account of the uncertainties of foundation settlement. The usual small bridge design consists of deck concrete girders (2 to 5 stringers, according to bridge width), with integral concrete deck and usually cantilever sidewalk or sidewalks. The Gerber type of cantilever girder system [see Enclosure "A", Fig. B] is used instead of continuous spans. For indeterminate size structures 3-hinged concrete arches with earth-filled spandrels are occasionally used with a rise usually about 1/8 the span. Heavy foundations are usually supported on timber piles (up to 20m (66 feet) long), driven by either steam or gravity hammers.

8. Principal Highway Bridges and some Important Railway Bridges

The information on the outstanding highway bridges and a few railway bridges in Lithuania based on my memory is contained in Enclosure B. In certain cases I have made diagrammatic sketches. [redacted] 25X1

[redacted] Data on railway bridges is based on casual observation. [redacted] I cannot supply any information on conditions subsequent to that date.

9. Specifications for Larger Bridges and/or Harbor and Port Facilities

In every instance, such bridges were awarded for design and construction to foreign firms. This was due to the scarcity of qualified designers and skilled steel workers. The principal firms were usually from Germany, Sweden, or Denmark.

It is interesting to note that old bridges (constructed before World War I) and spans not destroyed in World War I, were built in general of Soviet steel, heavier than and inferior to the German steel. Bridges constructed, in general, between 1918 and 1939 used German or Swedish steel.

10. Specifications for Medium and Small Bridges

The German norms for bridge construction were in use prior to World War II. The pattern adopted was the East Prussian standards. Concrete specifications were the German standards or "norms" for mixing operations and materials. Substructure footings and/or foundations were of the 1:3:6 mix. Above the footer line, the mix for structures was 1:2:4. For rich pavement surface slabs of the bridge roadway, wearing surface only, the mix was 1:1½:3.

Cement: Specifications adhere to the German norms. Coarse aggregate was gravel or crushed stone depending upon availability in the area. Water content and time of mix: The German standard was adopted in accordance with the mix and water factor or slump requirements.

German norms and specifications were used for steel bars, shapes and fabricated members. However, steel was avoided wherever possible for concrete because all steel was imported. Span lengths were controlled with this factor in mind. Relatively, this same thought was paramount for the workers. The nation had an abundance of concrete workers but a scarcity of steel workers.

It is well to note the "quick-setting cements" are not available due to excess costs; however, they were manufactured.

The largest cement factory is located at 5 km from Jurbarkas. Piling when driven by a steam hammer has a resistance test requirement of 50 blows for not more than 3cm of penetration.

11. Reconstruction of Structures (Using Wooden Span Only)

I estimate that local labor could replace destroyed spans with native timber as follows:

Span	Type of Replacement	Time
1-25m	girder or small truss	5 days
25-50m	trusses	1 month
50-100m	arch	6 months

The above time factors include delivery of timber, assembling, and erection.

-end-

ENCLOSURE (A): Types of Curved-Top Span Bridges, Gerber Spans
(B): Lithuanian Highway and Railway Bridges

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ENCLOSURE A

A. Types of curved-top span bridges:

1. 

Simple truss with curved top chord. Scheme of web members varies. End posts may be vertical, steeply inclined (as shown) or in line with top chord.

2. 

Tied trussed arch with suspended floor system.

3. 

Plate girder arch with suspended floor system.

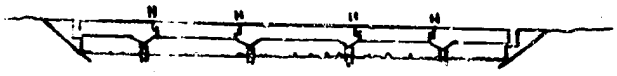
4. 

"Langer" truss: arched top chord; stiffening truss at level of floor system.

5. 

Modified "Langer" truss arched top chord; stiffening girder at level of floor system.

B. "Gerber" Spans to eliminate redundant support.



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ENCLOSURE B-1

Lithuanian Highway and Railway Bridges

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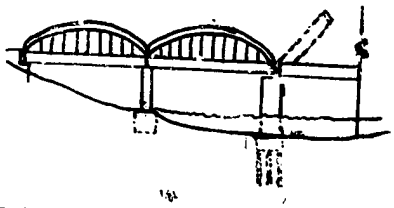
Locations of bridges were checked with source on WAC charts 153 and 168. Coordinates of bridges were measured from these charts and from AAF Aeronautical Chart 168A and USAF Target Complex Chart Kaunas (5790).

1. In Kaunas on the Kaunas-Raseiniai Highway over the Neris River.

Coordinates:	N - 54°, 54'; E - 23°, 53', 30"
Spans (number and length):	5@50m = 250m (164 ft = 820')
Width and capacity:	15 m (49 ft) clear
Clearance under:	Summer: 7-8 m (23-26 ft.) Extreme flood: 30 cm (1 ft.)
Materials:	Steel (#37 baustahl)
Type Designation:	Modified Langer truss (Stiffening girder)
Remarks:	Built by Hougaard & Schultz, 1931. Paving, Belgian block on membrane w.p. on RC floor slab. Top chords windbraced near midspan. Floorbeams, 5-6 m (16 20ft) span. Stringers spaced, 3-4 m. (10-13 ft). Floor slab, 17 cm (6 1/2") Design loading: (Road roller) (35k) 16T 8T (17.5k) Air cover shows bridge demolished

2. Between Kaunas to Alexota on the Kaunas-Kalvarija Highway over the Neman River.

Coordinates:	N - 54°, 53'; E- 23°, 55'
Spans (number and length):	4@ 50m clear (164 ft) 1@ 25m (82 ft) clear Air cover Source gives 40 m
Width and capacity:	15 m (49 ft) clear
Clearance Under:	Summer: 7-8 m (23-26 ft) Extreme flood: 30 cm (1 ft)
Materials:	Steel (#37 baustahl)
Type Designation:	Modified Langer truss (Stiffening girder) Plate girders. bascule
Remarks:	Top chords windbraced near midspan. Electrically operated double-leaf bascule. Design loading, same as above. Air cover shows temporary bridge



3. Between Kaunas to Aleksota on the Kaunas-Kazlu Ruda Railway over the Neman River.

Coordinates:	N - 54°, 53'; E - 23°, 55'
Spans (number and length):	2@ 72 m.o.c. (236 ft) 4@ 38 m.o.c. (124 ft) Scaled from air cover
Width and capacity:	2-track

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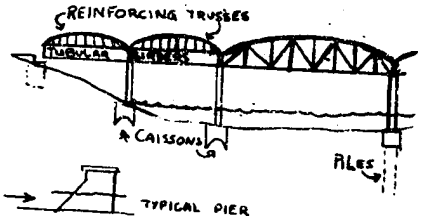
ENCLOSURE B-2

Clearance Under: Normal, 8 m. (26 ft)
Materials: Piers: Granite, large blocks
4 piers on C.I. caissons. 1 center pier on piles (restored by Germans, 1941)
Spans: Probably #37 b'st'l
Russian steel (brittle)
Type Designation: Camel back trusses. Tubular girders with curved reinforcing trusses over.
Remarks: Piers built by Russians, 1857. Spans by Hougaard & Schultz, 1930-31.
/Air cover shows center spans wrecked and chore spans removed; temporary 1-track bridge in place./

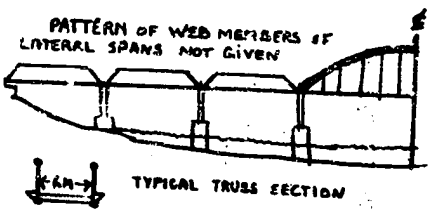


4. In Kaunas, south end, on the Panemune Highway over the Neman River.

Coordinates: N - 54°, 52'; E - 23°, 58'.
Spans (number and length): five (5)
Width and capacity: 6 m (20 ft)
Materials: Granite (massive)
Type Designation: Bowstring arch
Remarks: Important group of 3-story brick barracks both sides of highway near Kaunas end of bridge.

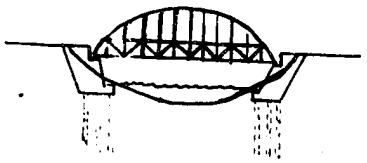
5. In Kaunas on the Kaunas-Vilkija Highway over the Neris River.

Coordinates: N - 54°, 55'; E- 23°, 54', 30"
Spans (number and length): 1@ 72 m. (236 ft)
6@ 36 m. (118 ft)
Width and Capacity: 6 m (20 ft) clear between trusses-brackets for footwalks.
Clearance Under: Summer: 8 m (26 ft)
Materials: Piers: Concrete
Spans: Steel (probably #37 baustahl)
Old Russian steel (brittle)
Type Designation: Langer truss
Quadrangular pony trusses. 4 m (13 ft) deep.
Remarks: /Air cover shows temporary bridge alongside/
Central span constructed 1929 by Flender A.G., Benrath am Rein.



6. Northwest of Kaunas on the Kaunas-Babtai Highway over the Nevežis River.

Coordinates:	N - 55°, 06', 30"; E - 23°, 47'
Spans (number and length):	1@ 110 m. (360 ft)
Width and Capacity:	12 m (39 ft) roadway and two footways @ 1.5 m (4.9 ft) between trusses.
Clearance Under:	Summer: 12-15 m (39-49 ft)
Materials:	Piers: Concrete-granite facing at upstream ends. Spans: German steel (probably #37 baustahl)
Type Designation:	Langer truss depth = 1/8 span
Remarks:	Longest span in Baltic states. Blown by Russians, restored by Germans, probably on same piers. Deck of concrete with asphalt topping. Bad foundation conditions - 20 m (66 ft) wood piles used. Concrete abutments.



7. In Jonava on the Vil'nius-Jonava Railway over the Neris River.

Coordinates:	N - 55°, 04', 30"; E - 24°, 17'
Spans (number and length):	2 or 3 @ 60 m± (197 ft)
Width & Capacity:	1 track
Materials:	Piers: [Double piers] Spans: German steel
Type Designation:	Through camel back trusses.
Remarks:	None

8. In Jonava on the Kaunas-Ukmergė-Siauliai Highway, 200 meters upstream from Bridge No. 7 over the Neris River.

Coordinates:	N - 55°, 04', 30"; E - 24°, 17', 30"
Materials:	Russian steel
Remarks:	Russian construction. Importance of highway much increased since Vil'nius (Vilna, Wilno) came under USSR control.

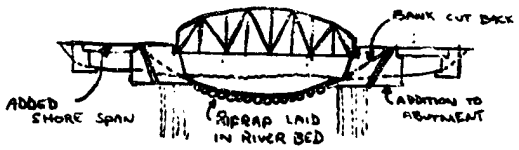
9. In Ukmergė on the Vil'nius-Panevėžys Highway (in town) over the Sventoji River.

Coordinates:	N - 55°, 15'; E - 24°, 46'
Spans (number and length):	3 or more @ 20 m (65 ft)
Width and capacity:	2 lanes with footwalk - 8 m (26 ft) over-all.
Clearance under:	5-6 m (16-20 ft) normal
Materials:	Concrete
Type Designation:	Deck girders.

ENCLOSURE B - 4

10. In Utena on the Kaunas-Daugavpils Highway over the Sventoji River.

Coordinates;	N - 55°, 30'; E - 25°, 35'
Spans (number and length):	1 @ 45 m (147 ft) 2 @ 10 m (33 ft)
Materials:	Piers: Concrete Spans: Steel - #37 Baustahl
Type Designation:	Semi-parabolic through
Remarks:	Specially bad foundation conditions. River bed between piers of main span ballasted with reprap to prevent sliding. Banks beyond those piers, which were originally designed as abutments, cut back to prevent slides; spaces spanned by approach spans. Piers on "fishpole" piles.



11. Near Prieniai over the Neman River.

Coordinates:	N - 54°, 35'; E - 24° 00'
Spans (number and length):	5* @ 40 m (131 ft)
Width and capacity:	12 m (39 ft) roadway and two footwalks @ 2 m (7 ft) each.
Clearance under:	Deck, 6-7 m (20-23 ft) above normal water. 4-5 m (13-16 ft) depth under.
Materials:	Piers: Concrete Spans: Concrete
Type Designation:	Gerber deck girders - 2 or 3 girders per span.
Remarks:	Source says location is not as shown on WAC chart; that chart is in error. Dam project nearby (1935). The Foundation Company did on job.

12. In Alytus on the Kaunas-Rumšiškas-Alytus-Kalvarija Highway (in town) over the Neman River.

Coordinates:	N - 54°, 24'; E - 24°, 04'
Spans (number and length):	4 or 5 @ 35 m (82 ft)
Materials:	Piers: Concrete Spans: Reinforced concrete
Type Designation:	Gerber deck girders

13. In Alytus on the Varena-Mariampolé Railway over the Neman River.

Coordinates;	N - 54°, 23'; E - 24°, 05'
Spans (number and length):	Unknown 60 m number (197 ft)
Width and capacity:	1 track
Materials:	Steel
Type Designation:	Semi-parabolic top chord
Remarks:	Originally of Russian construction. Restored twice by Germans after demolition.

14. In Merkine on the Varena-Leipalingis Highway over the Neman River.

Coordinates:	N - 54°, 09'; E - 24°, 11'
Spans (number and length):	"Several" Total 200 m (656 ft)
Materials:	Piers: Concrete
	Spans: Reinforced concrete
Remarks:	Highway now first class.

15. In Babtai, on the Kaunas-Ariogala Highway over the Nevežis (Nevaris) River.

Coordinates:	N - 55°, 06'; E - 23°, 47'
Spans (number and length):	"Several" @ 20 m (66 ft)
Materials:	Piers: Concrete
	Spans: Reinforced concrete
Type Designation:	Deck girders

16. On the Panevežys (in town) Highway over the Nevežis (Nevaris) River.

Coordinates:	N - 55°, 44'; E - 24°, 23'
Spans (number and length):	2 @ 30m ± (98 ft±)
Materials:	Piers: Concrete
	Spans: Concrete
Type Designation:	Arches with suspended deck

17. In Pasvalys on the Birzai Highway over the Musa River.

Coordinates:	N - 56°, 09'; E - 24°, 33'
Spans (number and length)	8 @ 20 m (66 ft.)
Clearance Under:	2-3 m (7-10 ft) Summer. Water Depth 2 m (7 ft)
Materials:	Steel
Type Designation:	Quadrangular pony trusses (no bracing)
Remarks:	/If highway route is as shown on WAC Chart 153, there must be several bridges over the Musa River/ Secondary highway.

18. In Anykščiai on the Ukmergis-Rokiskis Highway over the Sventoji River.

Coordinates:	N - 55°, 32'; E- 25°, 07'
Spans (number and length)	1 @ 50 m (164 ft)
Clearance under:	6 m (20 ft) summer
Materials:	Steel (#37 baustahl)
Type designation:	Through semi-parabolic top ch. Warren, subd, panels. Ht, 6 m (20 ft) above deck.
Remarks:	First class highway

19. In Taurage (in town, short way N on railway), Sovetsk (Tilsit)-Siauliai Highway over the Sesuvis River.

Coordinates:	N - 55°, 15'; E- 22°, 17'
Spans (number and length):	1 @ 50 m (164 ft)
Materials:	Steel
Type Designation:	Larger truss.
Remarks:	Main highway

20. In Sovetsk (Tilsit International Bridge, on Siauliai-Sovetsk-Taplacken Highway Queen Luise Bridge, over the Neman River.

Coordinates:	N - 55°, 05'; E - 21°, 54'
Spans (number and length):	5 or 6 @ 60 m (197 ft)
Width and capacity:	3 lanes and sotwalks
Materials:	Piers: Stone Spans: Steel-very heavy
Type Designation:	Tied trussed arch-suspended floor
Remarks:	Main highway.

21. In Rusné on Rusné-Kleipeda (Memel) Highway over the Neman River (near outlet).

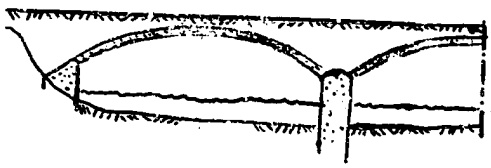
Coordinates:	N - 55°, 18'(See WAC Chart 168A) E - 21°, 18'
Spans (number and length):	1 @ 150 m (492 ft) Short approach spans
Materials:	Piers: Concrete (?) Spans: Steel (lighter than Sovetsk Br.) steel.
Type Designation:	Trussed arch, suspended deck. Parallel chord. pony trusses.

22. South of Salantai, East of Kartena, on the Kretinga-Siauliai Railway [valley].

Coordinates:	N - 55°, 58'±; E - 21°, 32'±
Spans (number and length):	5 @ 30 m ± (98 ft±)
Width and capacity:	1 track
Materials:	Piers: Stone, 20-25 m (66-82 ft) high Spans: Steel
Type Designation:	[Plate (?)] girders
Remarks:	Built by Hougaard & Schultz. Recent

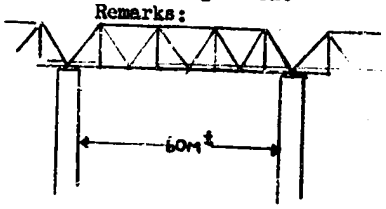
23. In Krone, near Ziezmariai, on the Kaunas-Vilnius Highway over the Streva River.

Coordinates:	N - 54°, 48'±; E - 24° 28'± Coordinates very uncertain. Source says WAC Chart 168 is in error on course of highway.
Spans (number and length):	three
Width and Capacity:	7 m (23 ft) between rails
Clearance under:	8 m (26 ft) summer
Materials:	Reinforced concrete
Type Designation:	3-hinged arches earth filled spandrels



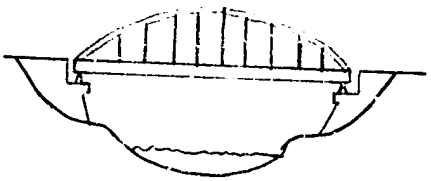
24. In Lydavenai on the Siauliai-Taurage Railway, at station, over Dubysa River (River very small - most spans are over a dry valley).

Coordinates:	N - 55°, 30'; E - 23°, 06'
Spans (number and length):	8‡ @ 60 m‡ (197 ft‡) on centers.
Width and capacity:	[1 track, according to WAC chart]
Clearance under:	Roadway 60 m‡ (197 ft‡) above valley floor.
Materials:	Piers: Concrete Spans: Steel
Type Designation:	Through [Warren ?] trusses
Remarks:	Replaces timber bridge built by Germans, 1915.



25. In Seredzius, on the Kaunas-Sovetsk (Tilsit) Highway, on north bank of Neman over the Dubysa River.

Coordinates:	N - 55°, 05'; E - 23°, 26'
Spans (number and length):	1 @ 50 m (164 ft)
Clearance under:	8-9 m (27-30 ft)
Materials:	Steel, #37 baustahl
Type Designation:	Modified Langer truss (with stiffening girder)
Remarks:	Built in 1931 by Flender A.G. Benrath am Rein.



26. Sovetsk (Tilsit), on Klaipeda (Memel) - Chernyakhovskiy (Insterburg) Railway over the Neman River.

Coordinates:	N - 55°, 05'; E - 21°, 54'
Spans (number and length):	4 or 5 (?)
Width and capacity:	[1 track, according to WAC chart]
Materials:	Steel
Type Designation:	Lenticular trusses

EXPLANATORY SKETCH NOT SUPPLIED BY SOURCE